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IFAS EXTENSION

Vegetable Protein Meal By-product Feedstuffs for Dairy Cattle¹

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The three major sources of protein used in the southeast are soybean meal, peanut meal and cottonseed meal. Soybean meal (44 or 48%) is considered the standard and in general is preferred by most feeders. Soybean meal may be replaced in the ration by either peanut meal or cottonseed meal when desired or when prices dictate that such a change is cost effective.

Soybean meal is obtained by grinding the cake, chips or flakes after removal of most of the oil from soybeans by a mechanical or solvent extraction process. Mechanical or expeller processed soybean meal contains 5 to 6% fat versus about 1% for solvent processed soybean meal. Soybean meal is marketed as 48% and 44% soybean meal. Soybean meal (48%) contains (DM) 87% TDN, 0.91 Mcal/lb NEL, 55.1% protein, and 10% ADF (NRC, 1989). Soybean meal is the standard protein supplement used in North America. While the bypass or undegradable intake protein (UIP) value of soybean meal may vary according to process and heat treatment, 39 samples tested and reported in the NRC publication averaged 35% (of crude protein content). Soybean meal is a palatable feedstuff and may be used as the major protein supplement for dairy and beef cattle.

COTTONSEED MEAL

Cottonseed meal contains less available protein and energy than peanut meal or soybean meal. This is especially true for available protein and for this reason rations containing cottonseed meal need to contain a little more protein (1 to 2%) to be equal to rations containing soybean or peanut meal. Also, some caution is suggested when using both cottonseed meal and whole cottonseed in dairy rations for high-producing cows due to the presence of the yellow polyphenolic pigment gossypol. Auburn researchers purposefully exaggerated the level of cottonseed products in diets to study evidence of gossypol toxicity. Cows consuming the highest level of gossypol showed more panting (heat discomfort) during hot weather, but no significant difference in feed intake or milk production. Physiological changes and gossypin tissues of cows suggested that intoxication is possible in mature ruminants consuming large amounts of cottonseed products high in free gossypol.

Peanut meal is the ground product of the shelled peanuts, composed principally of the kernels, with such portion of the hull and oil that may be left in the

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manufacturing process. Peanut meal contains (DM) 77% TDN, 0.80 Mcal/lb NEL, 52.3% protein, and 6% ADF. Expeller processed peanut meal contains about 6% fat and 8% more energy than solvent processed meal. Peanut meal contains less energy than soybean meal and less undegradable intake protein (25% vs 35% for soybean meal). Peanut meal is a very palatable protein supplement and can be used as the major source of protein in livestock rations. Since less UIP is available in peanut meal, other high bypass protein supplements are useful in balancing the UIP content of the ration.

Other oilmeals occasionally available at competitive prices are linseed meal, sunflower meal and canola meal. Also, corn gluten meal is an excellent source of protein for ruminant animals.

SUNFLOWER MEAL

The characteristics of sunflower meals are largely determined by the oil extraction process from which they are derived. Variations in protein (28 to 40%) and energy may occur due to the amount of hulls and processing methods such as mechanical or solvent extraction. Low-fiber, high-protein sunflower meal compares favorably with other oilseed meals in its composition and production responses for dairy animals.

Work at the University of Florida showed that high-fiber (28%), medium-protein (32%) sunflower meal was equal to cottonseed meal in protein quality and the fiber content was an effective source of fiber when used at a level of 25% of the ration.

CANOLA MEAL

Canola meal (originally known as rapeseed meal) contains about 37% crude protein on an as fed-basis and is an acceptable feed for ruminants. Canola meal has a lower energy level than soybean meal due to its greater fiber content. Studies conducted at the University of Manitoba showed that 25% canola meal in the grain mixture gave similar performance as grain rations containing soybean meal. Since the protein from canola meal is degraded

relatively rapidly in the rumen, a lower ruminally degradable protein source should be used in combination.

LINSEED MEAL

Linseed meal is obtained by grinding the cake or chips which remain after removing the oil from flaxseed and must not contain more than 10% crude fiber. Linseed meal is often found in rations for show cattle. Linseed meal is excellent as the only protein supplement for dairy cattle and aids in producing bloom and in making the hide mellow and the hair soft. Linseed meal is rarely used by livestock producers because of price.

CORN GLUTEN MEAL

Corn gluten meal is the dried residue from corn after the removal of the larger part of the starch and germ and the separation of the bran. It may contain fermented corn extracts and/or corn germ meal. Corn gluten meal is usually marketed as either 40 or 60% protein (90% dry matter). It is considered an excellent source of bypass protein for ruminants and a valuable source of the sulfur-containing amino acid methionine. As an excellent bypass protein, the protein is available postruminally for enzymatic digestion and absorption of amino acids for productive functions.